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OF THE NAMING OF SALMONELLAS, IS THERE NO END?

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SUMMARY: When phage P22 propagated on Salmonella chester and on S. budapest was allowed to act on a non-motile strain of S. paratyphi B, 11 serologically different strains resulted. Five were named serotypes (2 motile S. paratyphi B; 2 S. st. paul; one S. budapest). The remaining 6 were unnamed serotypes. Seven of these transductions were done in chick embryos and 4 in mice. It would seem likely that transductions can occur naturally in man and other animals and may, at least in part, be responsible for the 50 or so new salmonellae reported each year. It is therefore suggested that the recommendation of the Enterobacteriaceae Subcommittee of 1954 for the classification by antigenic formula rather than by name of Salmonellae isolated in future be preferred to the reverse recommendation of the same Subcommittee in 1955.

METHODS

The methods and materials used are described in separate papers (Velaudapillai, 1960a, b).

RESULTS

When phage P22 propagated on S. chester (4, 5, 12:e, h:

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e, n, x) was allowed to act on a non-motile strain of S. paratyphi B, organisms with eight different antigenic formulae were produced (Table 1).

Table 1. Transductants obtained with phage P22 propagated on S. chester (4, 5, 12:e, h:e, n, x) and a non-motile strain of S. paratyphi B (4, 12:-:-).

Recipient	Resultant
4, 12:-:-	1, 4, 5, 12:b:1, 2 (S. paratyphi B)
4, 12:-:-	1, 4, 12:b:1, 2 (S. paratyphi B)
4, 12:-:-	1, 4, 5, 12:e, h:1, 2 (S. st. paul)
4, 12:-:-	1, 4, 12:e, h:1, 2 (S. st. paul)
4, 12:-:-	1, 4, 5, 12:-:- (S. ?)
4, 12:-:-	4, 5, 12:-:- (S. ?)
4, 12:-:-	1, 4, 12:-:- (S. ?)
4, 12:-:-	4, 12:e, h:1,2 (S. ?)

The first seven transductants were isolated from embryonated eggs and the last in vitro. The first two transductants 1, 4, 5, 12:b:1, 2 and 1, 4, 12:b:1, 2 were S. paratyphi B, the second two 1, 4, 5, 12:e, h:1, 2 and 1, 4, 12:e, h:1, 2 were S. saint-paul and the remaining four were unnamed serotypes. It will be noted that four of the transductants had somatic antigen 5 although the recipient lacked it.

When phage P22 grown on S. budapest (1, 4, 12:g, t:-) acted on the same non-motile strain of S. paratyphi B, transductants with four different antigenic formulae were isolated (Table 2).

Table 2. Transductants obtained with phage P22 grown on S. budapest (1, 4, 12:g, t:-) and a non-motile strain of S. paratyphi B (4, 12:-:-)

Recipient	Resultant
4, 12:-:-	1, 4, 12:b:1, 2 (S. paratyphi B)
4, 12:-:-	1, 4, 12:g, t:- (S. budapest)
4, 12:-:-	1, 4, 12:g, t:1, 2 (S. ?)
4, 12:-:-	4, 12:g, t:- (S. ?)

The transductions were done in mice. The first resultant organism (1, 4, 12:b:1, 2) was S. paratyphi B, the second (1, 4, 12:g, t:-) was S. budapest and the remaining two organisms 1, 4, 12:g, t:1, 2 and 4, 12:g, t:- were unnamed serotypes.

DISCUSSION

It so happens that three of the transductants isolated from embryonated eggs and mice are known to occur naturally and hence are called S. paratyphi B, S. saint-paul and S. budapest. The two motile organisms with antigenic formulae 1, 4, 12:g, t:1, 2 and 4, 12:g, t:-, although isolated from mice, must be classified as unknown serotypes as these organisms have not been found under natural conditions.

Lederberg and Edwards (1953) and Edwards, Davis and Cherry (1955) by performing transduction in vitro isolated several unknown serotypes. They suggested that phages might be responsible for the appearance of new serotypes. The transductants obtained by the writer were isolated in vivo and therefore give more support to the idea that phages can effect serological changes under natural conditions. It is hard to believe that the seven different salmonellae isolated by Juenker (1957) from one man were all originally swallowed by him. May not phage action, at least in part, be responsible for the fifty or thereby new salmonellae added each year to a genus which even now numbers some 700 types? Where is this to end? Taking into consideration the somatic and flagellar antigens so far described there is opportunity, by permutation and combination for over 10,000 types. Would it not be better to adhere to the recommendation of the Enterobacteriaceae Subcommittee (Report, 1954) and to identify all new serological types by formulae only? The only additional suggestion would be that figures should be substituted for letters in denoting the groups in order to avoid running out of alphabet. Kauffmann (1958) subdivided salmonellae according to the somatic antigens. After group Z, the groups were numbered 49, 50.....S. typhi Vi 11 phages are also numbered partly with capital letters and partly with arabic numerals. It would be more convenient to use arabic numerals than two sets of systems.

Commonly occurring salmonellae, such as S. typhi, S. paratyphi B and S. typhimurium, should keep their names, for they appear to have stability and the names give some

information to the clinician, but names such as S. thomasville (once isolated from the rectum of a healthy dog) had better be forgotten. They are of no use to the clinician and the antigenic formula gives the epidemiologist the information he wants. Under the proposed scheme an organism with antigenic formula 1, 4, 5, 12:b:1, 2 would be reported as S. paratyphi B, one with formula 4, 12:e, h:1, 2 as S. group 2 (4, 12:e, h:1, 2). An organism with antigenic formula (3), (15), 34:y:1, 5 (S. thomasville) would be reported simply as S. group 5((3), (15), 34:y:1, 5).

It may be objected that names are easier to remember than antigenic formulae. But the Kauffmann-White list is likely to contain far too many names, many of salmonellae rarely isolated. For clinical, as opposed to epidemiological purposes, the group number would suffice; and for the latter the antigenic formula is essential.

I acknowledge with great pleasure the valuable help Prof. C.P. Beattie gave during the time the transduction experiments were done in vivo.

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THE SPECIES-DEFINITION IN THE FAMILY ENTEROBACTERIACEAE

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SUMMARY: A definition of the species in the family Enterobacteriaceae is given: "A species is a group of related sero-fermentative phage-types".

In two preceding papers "On the principles of classification and nomenclature of Enterobacteriaceae" and "Definition of genera and species of Enterobacteriaceae" the species were called "serologically defined subdivisions of the genera" and it was stated: "The species of Enterobacteriaceae are the established serotypes". It was added that "these species are in reality large groups which consist of a lot of fermentative types and of phage-types". Therefore it is better to define the species as follows:

"A species is a group of related sero-fermentative phage-types".

When the Salmonella-Subcommittee in the 1. Report (J. of Hyg. 34, 333, 1934) published the known Salmonella-types as species, these species were defined both serologically and biochemically. Only for shortness or simplification we are talking on sero-types or types, but in reality all these sero-types are defined also biochemically. Therefore it is more correct to call these types "sero-fermentative types".

The accepted type-species "Salmonella cholerae-suis" is such a sero-fermentative type. Also the species "Salmonella typhi", "Salmonella paratyphi B" etc. are all sero-fermentative phage types.

When we define a species as a group of sero-fermentative phage-types a change of the Bacteriological Code is not necessary, since the definition of the Salmonella-species is not identical with the definition of the word "sero-type" in the Code. This word means a serological subdivision of a species and can be used in our classification in the same sense:

The species Salmonella paratyphi A has the antigenic formula 1, 2, 12:a:- and a serological variant (= a special "serotype") has the formula 2, 12:a:- = S. paratyphi A var. durazzo.

Since the species is the basic category according to the Bacteriological Code, it should be defined so exactly as possible. According to the old classification the taxa (genus and species) are defined only biochemically, but according to the new classification—started by the Salmonella-Subcommittee—the species is defined both serologically and biochemically. There is no doubt that the new classification used in practice is much more effective than the old one.

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THE TAXONOMIC STATUS OF SERRATIA MARCESCENS BIZIO

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SUMMARY: 1. In our work we have studied morphological, cultural and biochemical characteristics of 68 strains of Serratia marcescens. 2. We propose that the genus Serratia may have only one species. 3. We propose to acknowledge strain BS 303 (ATCC 13880) as the neotype culture of Serratia marcescens Bizio.

The oldest known species of the genus Serratia is Serratia marcescens. It was named as early as 1823 and since this time both its nomenclature and its taxonomy have undergone many changes. Recognition of this species as the type species of the genus Serratia was proposed by Buchanan (1918). It is so recognized in all seven editions of the Bergey's Manual.

The taxonomy of Serratia marcescens has been investigated by Breed et al. (1924, 1927), Topley and Wilson (1931) and Krassilnikov (1949). The two latter authors place this species in the genus Chromobacterium as Chromobacterium prodigiosum. But the name Chromobacterium prodigiosum is very little used. Much new information concerning the biochemical and antigenic structure of Serratia marcescens has been published by Davis, Ewing and Reavis (1957).

MATERIAL AND METHODS

We have studied 68 strains secured from several collections under the label Serratia marcescens. The list of strains is given in Table 1. The methods used were those described in our previous work (Martinec and Kocur, 1960). The staining of flagella was made by Zettnow's method (Kabelík 1925).

Table 1.

No. of strains	Source of strains
301, 302, 303, 304, 813 731, 545, 544	Own isolates
147, 264	Institut of Plant Production, Prague
151	Institut of Epidemiology and Microbiology, Prague
766-798 (33 strains) 400, 412, 414, 420, 454	Prof. E. Steinhaus, Univ. of California, Berkeley
455	Culture Coll. of Entomogenous Bacteria, Prague
849	C.B. van Niel, Stanford Univ. Pacific Grove, California
772	Dept. of Agriculture, Ottawa, Canada
361	Epid. and Hygiene Station, Brno
375	Department of Microbiol. Hradec Králové
376, 377	E. Eltinge, Mont Holl. Coll. Massachusettes, U.S.A.
522	Dept. of Microbiology, Charles Univ. Prague
535	Inst. of Biology, Czech. Acad. Sci. Prague
548	Inst. of Microbiology, Univ. of Tucuman
549, 580	Dept. of Bact. Indiana Univ. Bloomington
619	B. Hampl. Dept. of Biol. Sciences, Prague
620	Dept. of Bact. Univ. of Queensland, Australia
689	Inst. of Fermentation, Sao Paulo, Brazil
696, 697	Dept. of Microbiol., Tech. School, Bratislava
761	W.C. Haynes, NRRL, Peoria, Illinois

RESULTS

Morphology. The cells of all 68 strains of Serratia marcescens studied are small Gram-negative rods occurring individually or in groups. Their size varied from 0.8-1.0 x 1.5-2μ. All the strains have motile cells.

Cultural characteristics. The colonies on nutrient agar are circular, 6-7 mm in diameter, with slight undulate margins, slightly convex, smooth. Red pigment was produced by most strains. In nutrient broth all the strains developed intense turbidity and formed slight sediment. Some strains formed red rings.

Cultural and physiological characteristics. The results of the study of biochemical characteristics of 68 strains of Serratia marcescens are given in Table 2.

DISCUSSION

Our study of 68 strains of Serratia marcescens brought many interesting notions. As it can be seen from the tabular summary No. 2, some strains showed different biochemical features. The most important variants here were: Strain 780 alone did not hydrolyze casein; strains 548 and 619 did not reduce nitrates; strains 303, 304, 772 and 787 showed positive hemolysis. It is interesting that the majority of these anomalies was observed in strains isolated from different species of insects (e.g. strains 780, 772, 787).

Relatively great variability of some strains was observed during the fermentation of carbohydrates. This problem was not met only by us but also by Davis et al. (1957). Also the differences in pigmentation are not surprising. On normal media and on media for pigmentation only 55 strains pigmented at normal cultivating temperatures. Out of these 55 strains only 15 pigmented at 37°C; 13 strains did not produce pigment at all.

The results obtained by us are essentially the same as those given in Bergey's Manual (1957), in Krassilnikov's Key (1949) and agree with the data stated by Davis et al. (1957).

We do not agree, however, with Krassilnikov's ascription of S. marcescens to the genus Chromobacterium solely on the basis of its ability to produce pigment. We believe that there are insufficient grounds for shifting this species to a very different genus. As we have ascertained, Serratia

Table 2. Results of biochemical tests with 68 strains of Serratia marcescens

Test	Number positive	Number negative
Gelatin liquefaction	68	0
Casein hydrolysis	67	1
Nitrate reduction	66	2
Hydrogen sulfide I.	67	1
Hydrogen sulfide II.	0	68
Indole	0	68
Milk	68	0
Hemolysis	4	64
Glucose	68	0
Gas from glucose	43	25
Lactose	2	66
Sucrose	68	0
Maltose	63	5
Galactose	64	4
Fructose	67	1
Rhamnose	0	68
Mannose	66	2
Inulin	0	68
Xylose	6	62
Arabinose	0	68
Glycerol	66	2
Adonitol	64	4
Sorbitol	67	1
Mannitol	68	0
Dulcitol	0	68
Starch	0	68
Esculin	68	0
Koser's citrate	67	1
Simmon's citrate	66	2
Acetylmethylcarbinol	66	2
Methyl red	0	68
KCN	68	0
Phenylalanin	0	68
Catalase	68	0
Urease	0	68
Lipase	67	1
5% NaCl	68	0
7.5% NaCl	47	21
Pigment	55	13

Hydrogen sulfide I. = lead acetate papers
Hydrogen sulfide II. = modified Klinger's agar

marcescens differs from the representatives of the genus Chromobacterium not only morphologically, but especially biochemically and in the chemical structure of its pigment.

Since 1823 when the species was first described, authors have described and named other new species. These new species were classified unsatisfactorily. In 1957 Davis et al. (1957) concluded that the genus Serratia is monotypic, including only one species.

We have devoted much study to this problem and have substantiated the findings of Davis et al. (1957) (Martinec and Kocur, 1960).

Owing to the fact that there exists no culture of the original strain of Serratia marcescens, we propose the approval of our strain 303 as a neotype culture. The description of proposed neotype of Serratia marcescens:

Serratia marcescens Bizio (strain BS 303, ATCC 13880)

Small Gram negative rods, occurring individually or in groups. The size of cells was 0.8 x 1.8μ. Motile by four lateral flagella.

Agar colonies (2 days): Circular with slight undulate margin, 4-6 mm in diameter, slight convex, smooth, produce red pigment.

Gelatin colonies (5 days): Circular, smooth sinking in 2-3 days in gelatin, white.

Agar slant (1 day): Smooth, white, taking on an orange-red to carmin red colour in 4-5 days.

Broth (1 day): Intense turbid and gray sediment.

Potato(2 days): Luxuriant growth, smooth, first white, later red colour.

Peptone water with carbohydrates: Acid but no gas formed from glucose, saccharose, maltose, galactose, mannitol, sorbitol, glycerol, mannose and adonitol. Not attacked by lactose, dulcitol, arabinose, rhamnose, xylose, inulin.

Milk (2 days): Alcaline, coagulation and peptonization.

Indole: -; H_2S: -; VP: +; MR: -; nitrate +; catalase +; urease -; lipase +; KCN +; phenylalanine -; Simmons' citrate +; Koser's citrate +; hydrolysis of gelatin +; casein +; hydrolysis of starch -; esculin +; hemolysis +.

Salt tolerance: Nutrient agar with 5% NaCl +; 7.5% NaCl +; 10% NaCl -.

Aerobic.
Optimum temperature 30°C, minimum 10°C, maximum 37° C.
Optimum pH 6.8, minimum 4.4, maximum 9.2.
Habitat: Isolated from pond water.

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INTERNATIONAL BULLETIN OF BACTERIOLOGICAL NOMENCLATURE AND TAXONOMY
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ON CLASSIFICATION AND TAXONOMY OF DYSENTERY BACTERIA

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SUMMARY: Here are listed the reasons determining the Soviet classification of the dysentery bacteria and the major differences from the International Schema of the International Subcommittee on Enterobacteriaceae. The Soviet arrangement is based on typospecific antigens irrespective of group variations of antigens.

Резюме.

В статье приведены обоснования, положенные в основу советской классификации дизентерийных бактерий. Проводится сопоставление международной и временной советской схемы. Вносится предложение об установлении эталонов типовых культур по типоспецифическому антигену, независимо от вариаций групповых антигенов, а также о совместной проработке принципиальных установок для построения классификационных схем.

It has been pointed out by W. H. Ewing et al. (1959) that the comprehension of publications on dysentery microbes by soviet students is impeded by the discrepancies in the nomenclature. This is due to some divergencies of the soviet classification schemes of Shigellae from the international one.

According to Soviet classification, the genus of dysentery microbes (Shigella) is divided into 4 species:

S. grigoriewa-Shigae
S. stutzeri-schmitzii
S. flexneri
S. sonnei

This classification is based on biochemical, enzymatic and serological differences between the species. Some of these species contain certain varieties which are grouped into subspecies and types. Thus, bacteria of the Grigorieva-Shigae species include varieties (subspecies) discovered by Novgorodskaya and Semenova. These students had no opportunity to compare their strains with the foreign ones. It is well known at the present that the Novgorodskaya-Semenova strains are identical to those of Large-Sachs.

The first and second species of the soviet classification are included in the subgroup A of the classification of the International Shigella Center. The numeration suggested by this classification, from 1 to 10, includes in the same series both the independent Grigorieva-Shiga or the Stutzer-Schmitz species and the Large-Sachs varieties (or Novgorodskaya-Semenova). While the former have apparently stabilized during evolution and have fairly constant clear cut characteristics, the Large-Sachs varieties are not at all as constant and their number is by no means confined to those already described. While it is possible and advisable to conceive the Grigorieva-Shiga and Stutzer-Schmitz bacteria as independent species there are no grounds to consider the various serological types of Large-Sachs bacteria as individual species. Hence, in the soviet nomenclature the subgroup A corresponds to two species of dysentery bacteria, viz. Shigella grigoriewa-shiga and S. stutzeri-schmitzii and by the variants described by Large, Sachs, and in the Soviet Union by Novgorodskaya and Semenova which are regarded as varieties of S. grigoriewa-shigae.

The S. flexneri species of the soviet classification has 3 subspecies, viz. the correct Flexner, Newcastle and Boyd-Novgorodskaya names. According to the international classification they correspond to the B and C subgroups. As pointed out by Ewing previously in 1949, these microbes have biological characters in common and are probably variants of bacteria of the S. flexneri species. However due to their antigenic and immunological heterogeneity they have to be isolated into several subspecies, two of which—proper Flexner and Boyd-Novgorodskaya—are divided into types which are cross related within the subspecies but mostly have a marked type-specific antigen. It does not seem expedient to produce an unlimited number of standard types by introducing numerous variants which have lost or restores some

group antigen. One should dispose of standards according to the type-specific antigen, that is to say the type should be represented by strain 3b as the most complete one or by 4b or 1a, etc. If we accept such a relatively constant set of type cultures as standards we shall be able to compare the types of the soviet nomenclature with those of the International Center. It appears from a comparison of the evidence obtained by Novgorodskaya (1959) and W.H. Ewing et al. (1959) that a comparative study by different workers does not show identity thorughout all types. This is due to excessive details of the antigenic composition and high variability of the group antigens. It seems necessary to establish for the type strains of S. flexneri a correspondence of type-specific antigens as the criterion for identification.

Our opinion is corroborated by the case of the Boyd-Novgorodskaya subspecies (S. boydii) in which the less differentiated antigenic structure enables one to demonstrate the coincidence of standard cultures in a greater number of cases.

One may agree completely with the division in the B and C subgroups (S. flexneri and S. boydii respectively) as assumed in the international classification. Yet, there exists a not less isolated subgroup of bacteria included in the international classification under the title of Type 6 (S. newcastle) which however is a biochemically heterogeneous set of types whose antigenic and immunological properties are largely obscure.

This is reflected by the Soviet classification in which every subgroup occupies the position of a subspecies.

Subgroup D of the international classification corresponds to S. sonnei species of the Soviet classification.

Within S. flexneri and S. boydii subspecies one should accept the designation of the types by arabic figures as suggested by the international classification. This will facilitate mutual understanding in the analysis of studies from various countries.

The above considerations require further collaboration for treating some general fundamental principles which are necessary for the construction of uniform classification schemes.

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A PROPOSED NEW GENUS OF GRAM-NEGATIVE COCCI: GEMELLA

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SUMMARY: Gemella gen. nov. is proposed as the name of a new monotypic genus, with type species Gemella haemolysans (Thjötta and Böe 1938) Berger (basionym Neisseria haemolysans Thjötta and Böe 1938). The genus Neisseria includes the aerobic, oxidase-positive species, Gemella the aerobic, oxidase-negative species and Veillonella the anaerobic, oxidase-negative species.

Neisseria haemolysans is a relatively new species of gram-negative, hemolyzing, aerobic diplococci which has been described, classified and named by Thjötta and Böe (1) and recognized by Branham, Pelczar and Murray (2) in Bergey's Manual (7th ed.).

The original strain (1) has recently been re-investigated and compared with five freshly isolated strains (3)(4). It could be shown that, in contrast to the other species of this genus, N. haemolysans does not possess either cytochrome-oxidase, or catalase, or peroxidase. Its respiration system is resistant to cyanide. On catalase-free media minute amounts of hydrogen peroxide are formed, and the organisms are only moderately sensitive to this compound. The action on carbohydrates is fermentative (5). On the basis of these properties, N. haemolysans resembles far less Neisseria than e.g. the streptococci.

On the basis of these results, it was felt that N. haemolysans deviates to such an extent from Neisseria as defined in Bergey's Manual (2) that it can not be retained in this genus. Since it differs also widely from the generally catalase-positive Veillonella (6)(7)(8) we propose a new genus to which the generic name Gemella (gemellus = diminutive of geminus = twin) was given (4). It contains as yet one single species: Gemella haemolysans.

By this procedure, Neisseria would include the aerobic,

oxidase-positive species, Gemella the aerobic, oxidase-negative species, and Veillonella the anaerobic, oxidase-negative species.

The proposed definitions of the genera Neisseria and Gemella with a description of G. haemolysans are given in the following:

FAMILY VIII. NEISSERIACEAE

Genus I. Neisseria

Cocci occurring in pairs with the adjacent sides flattened. Gram negative. Growth on non-enriched media may be poor. Some species produce yellowish or tan pigments. Biochemical activities are limited. Few carbohydrates are utilized; action on carbohydrates, if any, is generally oxidative. From sucrose a starch-like polysaccharide is synthesized by some species. Indol not produced. Nitrates not reduced. Cytochrome-oxidase, catalase and peroxidase are produced. Aerobic. Hemolytic strains occur in some species. Parasites of man and animals.

The type species is Neisseria gonorrhoeae Trevisan.

Genus II. Gemella nov. gen.

Cocci occurring in pairs with the adjacent sides flattened. Gram-negative. Growth on non-enriched media is poor. Pigments are not produced. Action on carbohydrates is fermentative. No starch-like polysaccharide is synthesized from sucrose. Indol not produced. Nitrates not reduced. Lacks cytochrome-oxidase, catalase and peroxidase. Respiration system is resistant to cyanide. Facultatively aerobic. Hemolytic. Parasites of man.

The type species is Gemella haemolysans (Thjötta and Böe) comb. nov.

1. Gemella haemolysans.

Spheres, 0.6 to 1.0 microns or more in diameter, occurring singly and in pairs with adjacent sides flattened. Type strain shows some very large cells. Gram-negative.

Blood agar colonies: Smooth, non-chromogenic, surrounded by a zone of clear hemolysis by the second day on rabbit blood agar; no hemolysis on sheep blood agar. Growth slow and delicate.

On nutrient agar growth is poor.

Excellent growth in thioglycollate broth with serum added.

Poor growth under strictly anaerobic conditions.

No growth on 5 per cent bile agar.

Acid from glucose, fructose, maltose, sucrose, dextrin, starch and glycogen; by some strains, weak acid production from arabinose, mannitol, sorbitol and inulin.

Methyl-red test positive.

Voges-Proskauer test delayed positive.

Gelatin and coagulated serum not liquefied.

Indol and hydrogen sulfide not produced.

Urea and esculin not hydrolyzed.

Nitrites not produced from nitrates.

Tributyrin hydrolyzed; fat not hydrolyzed.

Not pathogenic for white mice (nor with mucin or egg-yolk added.

Source: Human oral cavity.

Habitat: Human nucous membrane of the upper respiratory tract.

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INTERNATIONAL BULLETIN OF BACTERIOLOGICAL NOMENCLATURE AND TAXONOMY
Volume 11 No. 1 January 15, 1961 p. 21

REPORT OF PANEL ON CHOICE OF TYPE CULTURE FOR STREPTOCOCCUS AGALACTIAE LEHMANN AND NEUMANN

International Committee on
Bacteriological Nomenclature

Subcommittee on Streptococci and Pneumococci

The Panel consisted of:

Dr. D. V. Allison	Dr. C. F. Niven
Dr. S. J. Edwards	Dr. I. H. Pattison
Dr. P. Arne Hansen	Professor M. Seelemann
Dr. Rebecca Lancefield	The late Dr. J. M. Skerman
Dr. A. T. R. Mattick	Dr. A. W. Stableforth
Dr. G. Mocquot	Dr. R. E. O. Williams

The Panel considered the definition of Streptococcus agalactiae Lehmann and Neumann and its members have examined six different strains to determine which conformed most satisfactorily to an accepted definition of the species. Two strains received considerable support, namely Lancefield's strain "V8" and a strain received from Dr. A. W. Stableforth under the name G19. V8 often fails to ferment salicin and for this reason the majority of the members of the Panel recommend the adoption of G19 as the neotype culture for the species Streptococcus agalactiae Lehmann and Neumann.

The G19 strain was isolated in Australia and was first described by Stewart in 1937 (J. Path. Bact. 45:279).

Strain G19 is deposited in the National Collection of Type Cultures with the number 8181 and in the American Type Culture Collection with the number 13813.

R. E. O. Williams
Secretary

September 1960

INTERNATIONAL BULLETIN OF BACTERIOLOGICAL NOMENCLATURE AND TAXONOMY
Volume 11 No. 1 January 15, 1961 pp. 23-28

RESOLUTION OF THE CONFERENCE ON TAXONOMY OF ACTINOMYCETES, HELD IN MOSCOW FROM JUNE 8 TO JUNE 10, 1960

(The following communication was received from Prof. N. A. Krassilnikov.)

"Organisation Committee
of the Conference on Actinomycetes
Taxonomy. Lenin pr., 33,
Moscow, USSR.

Dear Professor Buchanan,

I am sending you the Resolution of the Conference on the Actinomycetes Taxonomy. The Conference was held in Moscow, 8-10 June 1960.

With best regards,

Prof. N. A. Krassilnikov
President of the Organisation
Committee."

After hearing the reports and discussion of materials presented on classification of actinomycetes, the Conference adopted the following resolution:

1. In recent years here in the USSR as well as abroad, the research scientists are paying increasing attention to the problem of classification of the actinomycetes.

The growth of interest in this problem is primarily due to the fact that actinomycetes as producers of antibiotics, vitamins and other biologically active substances and organisms, represent one of the most important groups of microorganisms.

In connection with this there is an obvious need for prompt and exact differentiation of the actinomycetes which have acquired special practical significance.

2. In recent years the number of newly described species of actinomycetes has greatly increased.

However, the Conference regrets that some investigators when describing new species and giving names for them, as well as when they redescribe old species, fail to observe regularly the requirements of the International Code for Botanic and Microbiological Nomenclature and Taxonomy.

3. Some of the investigations devoted to the new species

often fail to give a complete comparative description of microorganisms with reference to previous publications and sources in the scientific literature.

4. Different investigators often use non-standard and not commonly used substrata which offer other investigators no possibilities of making a comparative study of those cultures which had been described as new species.

5. A serious difficulty encountered in development of a harmonious classification reflecting the corresponding natural differentiation of microorganisms is presented by the fact that thus far among the research scientists working in the field of systematization of microorganisms and actinomycetes in particular, there is no agreement as to the importance and value of certain features and properties in determination of species.

In view of the above mentioned facts in the classification of actinomycetes and in their nomenclature, there is still much confusion which generally obstructs progress in the study of the actinomycetes.

In consequence of the considerable general theoretical and practical importance which the classification of actinomycetes has at present the Conference has agreed that the following measures are necessary:

I. In description of new species, in re-defining those which had been described earlier and in adopting new names for them, strictly to observe The International Code of Botanical and Microbiological Nomenclature.

Further, when describing new species one should make reference to the relevant data published earlier elsewhere in the literature and give the results of the comparative study conducted earlier with related cultures of the type under consideration. It is obligatory to give differential diagnosis.

II. Assuming that availability of type cultures of actinomycetes would considerably facilitate the work involving classification of newly isolated cultures the Conference deems it necessary to entrust the special Committee with a study of the actinomycetes cultures available at various biological museums and select from their number those which can be recommended as standard.

The selected standard cultures should be kept in museums of live biological cultures at the following research institutions: The Institute of Microbiology of the USSR Academy of

Science, the Institute of New Antibiotics of the USSR Academy of Medical Sciences, The All-Union Research Institute of Antibiotics (Moscow), and at the Leningrad Institute of Antibiotics.

The work on compiling the title list of standard cultures is to be entrusted to the Commission consisting of the following scientists:

N. A. Krassilnikov A. I. Korenyako O. I. Artamonova	The Institute of Microbiology of the U. S. S. R. Academy of Sciences
G. F. Gause T. B. Preobrazhenskaya M. A. Sveshnikova	The Institute of the USSR Academy of Medical Sciences for the Research on New Antibiotics
V. D. Kuznetzov S. M. Rudaya N. K. Solovjeva	The All-Union Research Institute of Antibiotics
V. A. Tsyganov	The Leningrad Institute of Antibiotics

Compiling of the list of standard cultures is to be completed by January 1, 1961.

III. The Conference entrusts the above mentioned Commission with the following:

a) to make detailed studies in order to redefine by isolation those cultures of actinomycetes whose allocation to definite species is still doubtful. Investigation of such cultures should be incorporated in the plans for joint studies to be conducted by the respective Institutes;

b) to resolve the various issues important for systematized classification.

IV. With the aim of eliminating differences in descriptiion of cultures the Conference constitutes a special Sub-Commission whose members are N. I. Nikitina, A. G. Kutchaeva (The Institute of Microbiology of the USSR Academy of Science); T. S. Maksimova, E. S. Kudrina (The Institute of the USSR Academy of Medical Sciences for the Research of New Antibiotics); A. A. Melnikova (The All-Union Research Institute on Antibiotics); and K. Vinogradova (The Laboratory of Antibiotics of the Moscow State University) with:

a) compilation of a list of media to be considered as obligatory in the study and description of new species of actinomycetes, taking into account, in compiling it, also those media which have been developed by the Soviet scientists and mentioned in the reports read at this Conference;

b) development of a scheme to be used for description of the cultural, morphologic, and other properties of actinomycetes, with special attention being paid in it to the methods to be applied for identification of each specific feature:

c) the Sub-Commission should have its work completed before January 1, 1961.

V. The Conference has decided to entrust to the Commission whose members were mentioned in the paragraph II of the present Resolution, the consideration and approval of the list of media recommended by the Sub-Commission and the scheme for description of cultures and see to the publication of these findings during 1961.

VI. The Conference deems it necessary that all the newly described cultures of actinomycetes be transferred to special Museums of live cultures at the Institute of Microbiology of the USSR Academy of Sciences, in which should be stored all the cultures of actinomycetes described in the literature.

All the cultures of any practical value and their varieties are to be kept in the live culture Museum of the All-Union Research Institute of Antibiotics.

VII. The Conference attaches great significance to the study of variability in actinomycetes as an important guide in systemization. Apart from enriching our understanding of the process of evolution, i.e. our concepts on parental relations between microorganisms and relations between separate species the study of variation provides the investigator with needed data as to possible forms of existence of cultures of certain kinds under defined conditions.

First of all a thorough study should be made of the variability of those cultures which are extensively used for practical purposes, as well as of the most important representatives of the type cultures.

Special attention should be paid to the study of possibilities of changing such important properties used for determination of species such as the ability to produce certain antibiotics and pigments; also very important is the study of structure of spores, of cells, etc.

The Conference considers it to be expedient to continue

further research on hybridization of actinomycetes with the purpose of collecting data on parental relations among various groups of actinomycetes.

VIII. The facts collected on the use of actinophages in classification of actinomycetes clearly indicate that indications of susceptibility or stability in biological cultures to certain specific actinophages can be advantageously applied for differentiating them in some cases into species, and in others—into types within a certain species.

However the number of specific actinophages available at present is rather limited.

The Conference considers as an important task the further extension of investigations in the field of isolation, study and extensive practical verification of the specific qualities of actinophages. The Conference applies to the Institute of Microbiology of the USSR Academy of Sciences with the suggestion to gather a collection of typical actinophages and to make available to other research institutions.

At the same time the Conference attaches a considerable significance to the thorough study of lysogeny phenomena and the effect of symbiotic actinophages upon the specific biological properties of lysogenic cultures.

The Conference attaches significance to the extension of investigations on the application of serologic methods for classification of actinomycetes.

In connection with such serologic studies the following measures are necessary:

a) perfection of methods for obtaining the highly active specific antigens and serums as well as perfection of methods for investigation of serologic properties of the cell and its separate parts;

b) study of serological properties of experimentally derived varieties of type cultures;

c) to approach the All-Union Institute of Antibiotics with the request that it make available for the purposes of research serums which are specific for the type cultures of actinomycetes.

IX. The Conference also attaches importance to the following measures:

a) extending investigations in the field of studying species peculiarities in study of microscopic morphology of actinomycete colonies and of observing their specific features in microscopic sections;

b) generalization of the collected cytological data on development of microscopic morphology of the mycelium of industrial cultures as found in extensive fermentation;

c) sponsoring special investigations on study of cytochemical and biochemical properties of actinomycetes with the purpose of assessing the possibilities of making use of these properties for their differentiation;

d) to considerably extend all kinds of investigations of pigments.

X. The Conference deems it necessary to address the USSR Taxonomy Committee proposing establishment of a special Sub-Committee under it on taxonomy and systematization of actinomyces, and to transmit its membership to the International Committee on Taxonomy of Microorganisms.

To instruct such Sub-Committee to publish either in the magazine "Microbiologiya" or "Antibiotiki", or to publish as a separate booklet the International Rules of Taxonomy and systematization of microorganisms (Code of Nomenclature of the Bacteria and Viruses.)

To make the appropriate arrangements for publishing the Code of Colours. Pending its publication the Conference recommends to all the use of the Bondartsev Code.

XI. The Conference attaches special importance to publication of instructions on systematization of actinomycetes as well as instructions on methods for their investigation.

XII. The Conference addresses to the All-Union Research Institute of Antibiotics a request to supply various research institutions with cultures immunable to certain antibiotics.

XIII. The Conference deems it of particular importance that various research institutions working in the field of systematization of actinomycetes be provided with "standard" antibiotics.